

Predictors of Football-Related Injuries Among Malaysian Collegiate Players: Analysis of Positional Roles, Playing Experience, and Injury Prevention Practices

Tham Sze Kei¹, Tee Yi Ki¹, Wong Wan Zhi¹, Mohamad Nashrullah Mohd Saleh¹, Nor Azura Azmi¹, Muhammad Noh Zulfikri Mohd Jamali², Kanagarajah Rarujanai³, *Mohd Azzuan Ahmad¹

¹ Physiotherapy Programme & Centre for Rehabilitation and Special Needs Studies (iCaRehab), Faculty of Health Sciences, Universiti Kebangsaan Malaysia, Jalan Raja Muda Abdul Aziz, 50300 Kuala Lumpur, Malaysia

² Department of Physiotherapy, M Kandiah Faculty of Medicine and Health Sciences, Universiti Tunku Abdul Rahman, Selangor, Malaysia

³ Institut Pendidikan Guru Malaysia Kampus Tun Abdul Razak, Jln Datuk Mohammad Musa, 94300 Kota Samarahan, Sarawak, Malaysia

ARTICLE INFO

Article history:

Received 7 December 2025

Revised 26 March 2026

Accepted 2 September 2026

Online first 15 September 2026

Published 15 September 2026

Keywords:

FIFA 11+,
Injury Prevention,
Football,
Collegiate Players,
Malaysia.

ABSTRACT

Football-related injuries are highly prevalent among collegiate players, particularly in Malaysia where systematic prevention strategies are underutilized. The FIFA 11+ Injury Prevention Program (IPP) is proven to reduce injury risk by up to 46% when fully implemented, yet its adoption and effectiveness in the collegiate setting remain poorly understood. Identifying predictors of injury in this context is essential for tailoring targeted preventive strategies. Objective: This study aimed to examine the predictors of football-related injuries among Malaysian collegiate players, focusing on positional roles, years of playing experience, and adherence to the FIFA 11+ program. A cross-sectional online survey was conducted between February and August 2024 among 80 male collegiate football players recruited from universities in Malaysia. A structured bilingual (Malay and English) questionnaire collected data on demographics, football background, injury history, and FIFA 11+ practices. Statistical analyses included chi-square tests, ANOVA, and binary logistic regression, with results expressed as adjusted odds ratios (AOR) and 95% confidence intervals (CI). The prevalence of football-related injuries was 82.5%, with lower limb injuries accounting for 96.9% of cases. Among injured players, 63.6% sustained multiple injuries, with sprains (42.5%) and muscle strains (36.3%) most common. Midfielders had the highest risk of multiple injuries compared with goalkeepers (AOR = 8.67, 95% CI: 1.59–47.15, $p = 0.012$), while players with more than 10 years of experience were

^{1*} Corresponding author. E-mail address: azzuanahmad@ukm.edu.my

nearly six times more likely to sustain multiple injuries than novices (AOR = 5.70, 95% CI: 1.20–27.12, $p = 0.029$). Only 17.5% of respondents fully adhered to the FIFA 11+, whereas partial (62.5%) or non-adherence (20.0%) significantly increased injury risk. Rare implementation and incomplete performance of program components were strongly associated with multiple injuries ($p < 0.05$). This study demonstrates that positional demands, prolonged playing experience, and poor adherence to the FIFA 11+ program are key predictors of multiple injuries in Malaysian collegiate football. Targeted prevention for high-risk groups and institutional strategies to strengthen program adherence are essential to reduce injury burden and enhance player safety.

1. INTRODUCTION

Football, or soccer, is the most widely played and followed sport worldwide, with more than 265 million registered players across all levels of competition (Herrero et al., 2014). In Malaysia, football is similarly popular, with nearly 180,000 registered players reported by the Football Association of Malaysia (FAM) in 2019 (Ahmad-Shushami & Abdul-Karim, 2020). However, football also carries a substantial risk of injuries, particularly to the lower limbs, due to frequent high-intensity actions such as sprinting, pivoting, tackling, and jumping (Robles-Palazon et al., 2022). Collegiate players represent a particularly vulnerable population because they face dual academic and athletic demands that limit recovery and increase cumulative strain (Hamdan et al., 2022). Injuries at this level not only disrupt athletic performance but also threaten academic progress and may lead to long-term disability if poorly managed (Hamdan et al., 2022). Despite this, systematic research on injury determinants among Malaysian collegiate football players remains limited, creating gaps in prevention strategies that address the realities of this setting.

Available surveillance data suggest that football injuries in Malaysia are both frequent and severe (Ahmad-Shushami & Abdul-Karim, 2020; Hamdan et al., 2022; Hamid et al., 2014). At the 2018 Malaysian Games, the injury incidence was 64.64 per 1,000 match hours, with lower limb injuries dominating the reports (Ahmad-Shushami & Abdul-Karim, 2020). Comparable trends have been noted in the FELDA/FAM National Futsal League, where ankle sprains, hamstring strains, and knee injuries, including anterior cruciate ligament (ACL) tears, were among the most common (Hamid et al., 2014). Such injuries, especially when recurrent, reduce playing continuity and increase the risk of chronic musculoskeletal issues (Hamdan et al., 2022). Importantly, evidence suggests that injuries are not evenly distributed among players but vary depending on intrinsic and extrinsic factors such as positional demands, years of experience, and exposure to preventive programs (Ahmad-Shushami & Abdul-Karim, 2020; Hamdan et al., 2022). Understanding how these predictors operate in the Malaysian collegiate context is vital for developing targeted interventions that can meaningfully reduce injury burden.

One structured preventive strategy that has demonstrated global efficacy is the FIFA 11+ Injury Prevention Program (IPP) (Sadigursky et al., 2017). This warm-up protocol, consisting of running, strength, plyometric, and balance exercises, has been shown to reduce injuries by up to 46% when implemented consistently (Sadigursky et al., 2017; Silvers-Granelli et al., 2015). The program is particularly effective in lowering ACL injuries and enhancing neuromuscular control (Thorborg et al., 2017). However, its effectiveness is strongly linked to adherence (Sadigursky et al., 2017). Studies have consistently found that partial or irregular implementation undermines preventive effects (Slauterbeck et al., 2019). Barriers such as time constraints, lack of awareness, and insufficient coach training are frequently reported (Donaldson et al., 2018; Shamlaye et al., 2020). While adherence to the FIFA 11+ has been explored in youth and

professional populations (Sadigursky et al., 2017), little is known about its use among Malaysian collegiate players, where institutional support and medical resources may be limited. Clarifying the relationship between program adherence and injury occurrence in this group is essential for guiding physiotherapists and coaches in optimizing injury prevention.

In addition to preventive practices, evidence highlights the importance of positional roles and years of experience as injury predictors (Almeida, 2013; Hwang-Bo & Joo, 2019; Leventer et al., 2016). Midfielders, who typically cover the greatest distances and perform the highest number of sprints and directional changes, are consistently reported to be more injury-prone compared with other positions (Almeida, 2013; Hwang-Bo & Joo, 2019). Positional demands, from extensive running for midfielders to aerial duels and physical contact for defenders, expose players to different biomechanical stresses that influence injury outcomes (Leventer et al., 2016). Playing experience is another factor with a dual effect. While experience can improve skill and physical conditioning, thereby offering some protection (Haxhiu et al., 2015), long-term participation also accumulates repetitive stress and increases the risk of reinjury (Rogalski et al., 2013). The interplay of these predictors is particularly relevant in Malaysian collegiate football, where extended participation, demanding positions, and inconsistent prevention practices converge. Therefore, this study aims to evaluate the predictors of football-related injuries among Malaysian collegiate players, with a specific focus on positional roles, playing experience, and adherence to the FIFA 11+ program. By addressing these factors, the study seeks to generate context-specific evidence to inform effective, targeted interventions that can reduce injury rates and enhance player safety and performance.

2. METHODS

Study Design

This study employed a cross-sectional design using an online survey to investigate injury patterns, football background, and prevention practices among Malaysian collegiate football players. The cross-sectional approach was appropriate as it enabled the simultaneous assessment of exposures (playing position, years of experience, and adherence to the FIFA 11+ program) and outcomes (injury frequency) within a defined population.

Ethics Approval

The survey was conducted between February and August 2024 following approval from the Universiti Kebangsaan Malaysia Research Ethics Committee (RECUKM JEP-2023-983). All procedures adhered to the principles of the Declaration of Helsinki. Prior to survey initiation, respondents were provided with comprehensive information regarding the study objectives, procedures, confidentiality safeguards, and data usage. Electronic informed consent was obtained, and participation was entirely voluntary. To ensure data privacy, all responses were anonymized, and no identifiable information was retained or linked to the dataset.

Target Population

The study targeted collegiate football players from both public and private universities in Malaysia to ensure representation across diverse institutional contexts. Inclusion criteria were: (i) Malaysian collegiate football players aged 18 years or older, (ii) active participation in training or competitive matches within the preceding six months, and (iii) ability to complete the questionnaire in either Malay or English.

Exclusion criteria were: (i) non-players such as coaches, referees, or medical staff, (ii) individuals not actively engaged in football during the study period, and (iii) players participating solely at a recreational or leisure level rather than in collegiate competition. Although both male and female players were eligible, only male respondents completed the survey, which is acknowledged as a contextual limitation of the study.

Sample Size, Sampling and Procedures

Sample size estimation was based on both population-proportion calculations and regression modelling requirements. Using a conservative assumption of a population proportion (p) of 0.05, a 95% confidence level ($Z = 1.96$), and a margin of error (E) of 0.05, the minimum required sample size was calculated as:

$$n = \frac{Z^2 \times p \times (1 - p)}{E^2}$$

This yielded a recommended sample of approximately 73 respondents, corroborated using an online calculator (Wang & Ji, 2020). To account for potential non-responses, the target recruitment was rounded to 75 respondents. In addition, the adequacy of the sample size was justified based on binary logistic regression requirements. A widely cited rule of thumb recommends 15 to 20 observations per predictor variable to ensure stable estimation of regression coefficients and minimize risk of overfitting (Bujang et al., 2018). As this study examined three predictors (playing position, years of experience, and adherence to the FIFA 11+ program), a minimum of 60 respondents was deemed sufficient to provide adequate statistical power and robust parameter estimation. A non-probability convenience sampling strategy was employed due to practical considerations in accessing collegiate football players. Recruitment was coordinated through institutional representatives and football program coordinators, who were contacted via email and social media platforms. Upon securing institutional cooperation, the survey link was disseminated to players through official representatives and electronic communication channels. The study objectives, procedures, and potential benefits were explained in advance to encourage informed participation. To maximize response rates, periodic reminders were issued, and clear instructions were provided to ensure accurate completion of the questionnaire. Efforts to reduce potential selection bias included recruiting respondents from both public and private universities and across different playing positions and levels of experience.

Research Instrument: Online Survey Questionnaire

Data were collected using a structured, bilingual (Malay and English) online questionnaire consisting of 23 multiple-choice items. The instrument was organized into four domains: (i) personal information (age, ethnicity, height, weight, institution), (ii) football background (playing position, competitive level, years of experience, training and match frequency), (iii) use of the FIFA 11+ Injury Prevention Program (IPP), including awareness, implementation frequency, and specific components performed (e.g., running drills, strength exercises, plyometrics), and (iv) injury history, including type of injury, body region affected, recovery duration, and frequency of injury occurrence. Questionnaire development was informed by guidelines from the FIFA Medical Assessment and Research Centre (Fuller, 2006). A pilot test involving 10 collegiate players was conducted to evaluate clarity, feasibility, and relevance. Feedback from the pilot led to refinements such as simplified wording, improved formatting, and clearer response categories.

Within the survey, three primary predictors were examined in relation to football-related injuries. Playing position was categorized as goalkeeper, defender, midfielder, or forward to reflect positional demands that may influence injury susceptibility. Years of experience was grouped into five categories (<1 year, 1-3 years, 4-6 years, 7-9 years, >10 years) to capture potential cumulative effects of long-term football participation. FIFA 11+ practices were assessed through reported implementation level (none, partial, full), frequency of use, and number of components performed, representing adherence and program fidelity. The outcome variable was multiple injuries, defined as sustaining two or more distinct football-related injuries during the observation period. This was coded as a binary variable: 0 = one or no injury, 1 = multiple injuries.

Data Privacy and Security

All data were anonymized at the point of collection and stored in encrypted files accessible only to the research team. Electronic consent forms and identifiers were securely stored separately from survey responses to prevent re-identification. Access to raw datasets was restricted through password-protected systems, and all communications with respondents were conducted via secure, encrypted online platforms to ensure compliance with ethical and data protection standards.

Data Analysis

Data were first screened for completeness, with incomplete or duplicate responses excluded. Descriptive statistics were used to summarize demographic variables, football backgrounds, and FIFA 11+ practices. Associations between categorical variables (e.g., playing position, adherence levels) and injury outcomes were tested using chi-square analyses, while continuous variables such as age and body mass index (BMI) were compared using one-way analysis of variance (ANOVA). To identify independent predictors of multiple injuries, binary logistic regression was conducted. Predictor variables included playing position, years of experience, and adherence to the FIFA 11+ program. Results were expressed as adjusted odds ratios (AOR) with corresponding 95% confidence intervals (CI). Model fit was assessed using the Hosmer–Lemeshow test, and statistical significance was set at $p < 0.05$. Analyses were performed using IBM SPSS Statistics version 29.

3. RESULT AND DISCUSSION

Respondents Demographics

Of the 103 football players who completed the survey, 80 respondents met the inclusion criteria. All were male, with a mean age of 23.48 years (SD = 4.54) and a mean body mass index (BMI) of 22.65 kg/m² (SD = 3.31). Ethnic distribution included Malays (51.2%), Chinese (37.5%), Indians (7.5%), and other ethnicities (3.8%). More than half of the respondents were affiliated with public universities (55.0%), while the remainder were from private universities (45.0%) (Table 1). Significant institutional differences were observed for age ($p = 0.033$) and ethnicity ($p < 0.001$), with private university players being older on average and predominantly Chinese, whereas public universities had a higher proportion of Malay players.

Playing position distribution was dominated by midfielders (47.5%), followed by defenders (35.0%), goalkeepers (12.5%), and forwards (5.0%) (Table 1). Most players competed at the amateur level (85.0%), with smaller proportions of semi-professionals (12.5%) and professionals (2.5%). Playing experience varied considerably; 38.8% reported more than 10 years of experience, while 12.5% had less than one year

playing experience (Table 1). Training at least once weekly was reported by 56.3% of respondents, while 43.8% trained less frequently. Match participation was more variable, with only 38.8% playing regularly and 61.3% reporting occasional match involvement.

Table 1: Demographic and football-related characteristics of Malaysian collegiate football players (n = 80)

Variable		Overall (n = 80)	P- value
		n (%) or mean $\pm$ SD	(χ^2 or F-value)
Age, years	Overall	23.48 $\pm$ 4.54	
	Public institution	22.50 $\pm$ 4.18	P=0.033* (4.73)
	Private institution	24.67 $\pm$ 4.73	
Ethnicity	Malay	41 (51.2%)	P<0.001* (51.3)
	Chinese	30 (37.5%)	
	Indian	6 (7.5%)	
	Others	3 (3.8%)	
BMI, kg/m ²	Overall	22.65 $\pm$ 3.31	
Playing position	Goalkeeper	10 (12.5%)	P<0.001* (37.2)
	Defender	28 (35.0%)	
	Midfielder	38 (47.5%)	
	Forward	4 (5.0%)	
Playing level	Amateur	68 (85.0%)	P=0.260 (2.70)
	Semi-professional	10 (12.5%)	
	Professional	2 (2.5%)	
Playing experience	<1 year	10 (12.5%)	P=0.001* (18.87)
	1-3 years	12 (15.0%)	
	4-6 years	11 (13.8%)	
	7-9 years	16 (20%)	
	>10 years	31 (38.8%)	

History of sport-related injury	Yes	66 (82.5%)	$P < 0.001^*$ (33.8)
	No	14 (17.5%)	
Practise of FIFA11+ IPP	No	16 (20.0%)	$P < 0.001$ (28.8)
	Yes	64 (80.0%)	
Number of FIFA11+ IPP components implemented	None	16 (20.0%)	$P = 0.057$ (7.54)
	One	28 (35.0%)	
	Two	22 (27.5%)	
	Three	14 (17.5%)	

Note: BMI = body mass index. Values are presented as frequency (n) and percentage (%) for categorical variables, and mean $\pm$ standard deviation (SD) for continuous variables. Between-group comparisons were performed using Chi-square tests for categorical data and one-way ANOVA for continuous variables. Statistical significance was set at $p < 0.05^*$.

Football Injury Details

The prevalence of football-related injuries among Malaysian collegiate players was notably high, with 66 of 80 respondents (82.5%) reporting at least one injury (Table 1). Of these, 42 players (63.6%) sustained multiple injuries, reflecting a considerable cumulative burden within this cohort. Lower limb injuries predominated, accounting for 96.9% of all reported injuries, with the knee and ankle most frequently affected, followed by hamstring and quadriceps strains. Upper limb injuries were reported by 18.8% of respondents, primarily shoulder dislocations and wrist sprains. Trunk injuries occurred in 8.8% of players, most often low back pain and rib contusions, while head and neck injuries were relatively rare (2.5%). Injury types were dominated by sprains (42.5%) and muscle strains (36.3%), with ligament tears and fractures less common but associated with extended recovery durations.

Recovery times varied considerably. While 73.8% of injuries resolved within six months, 17.5% required up to one year of recovery, and 8.8% persisted beyond one year, suggesting a subgroup of players with prolonged or recurrent conditions. Recurrence was reported by 30.0% of injured players, most frequently involving ankle and knee injuries. This pattern underscores the vulnerability of weight-bearing joints to reinjury in the collegiate football setting. Injury prevalence varied significantly by playing position. Midfielders were the most affected, with 89.5% sustaining at least one injury, followed by defenders (85.7%), forwards (75.0%), and goalkeepers (50.0%). Midfielders contributed disproportionately to the injury burden, accounting for 51.5% of all cases despite representing 47.5% of the sample. Defenders contributed 36.4%, whereas goalkeepers and forwards accounted for 7.6% and 4.5% of injuries, respectively. The association between playing position and injury occurrence was statistically significant ($\chi^2 = 8.952$, $df = 3$, $p = 0.030$), confirming that positional demands strongly influence risk.

Analysis of multiple injuries revealed further positional differences. Midfielders were again the most vulnerable, with 68.4% sustaining more than one injury, followed by defenders (50.0%), goalkeepers (20.0%), and forwards, none of whom reported multiple injuries (Figure 1). This association was also statistically significant ($\chi^2 = 12.589$, $df = 3$, $p = 0.006$), reinforcing the position-dependent nature of injury risk. Midfielders accounted for 61.9% of multiple injuries, underscoring their heightened exposure due to extensive running, sprinting, and frequent contact during play. Notably, players with more than 10 years of football experience were significantly more likely to report multiple injuries compared with those with less

experience ($p = 0.031$). By contrast, no significant associations were observed between injury history and age or BMI.

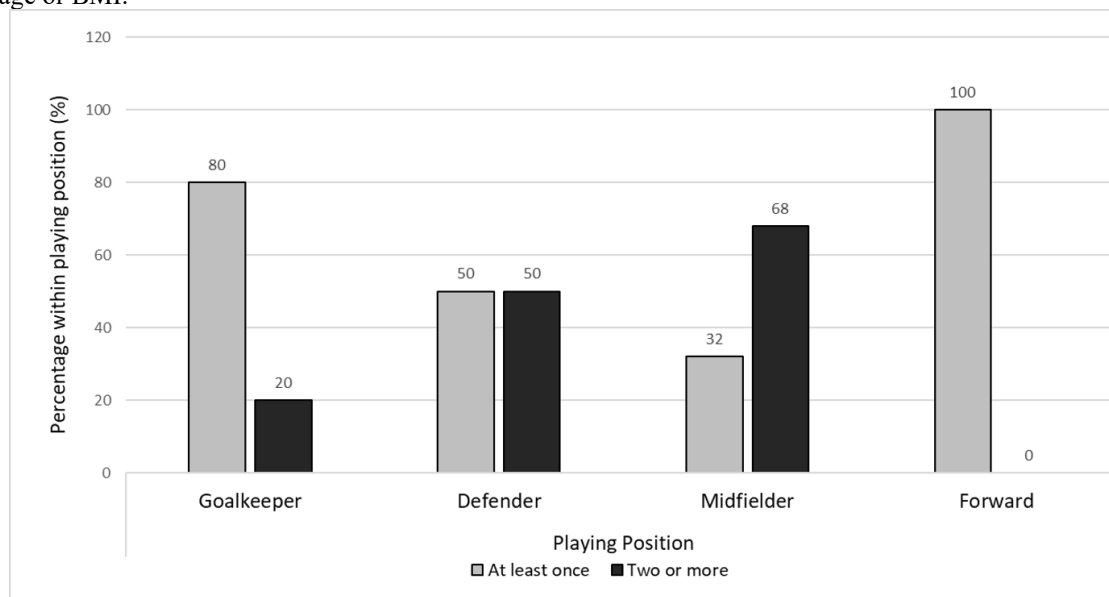


Figure 1: Prevalence of single and multiple injuries across different playing positions

Injury Prevention Program Participation

Overall, 80.0% of respondents reported some level of adherence to the FIFA 11+ Injury Prevention Program (IPP). However, only 17.5% practiced the program in full, while 62.5% implemented it partially, and 20.0% did not use it at all (Figure 2). Analysis of individual components revealed that running drills (56.3%) and strength exercises (52.5%) were the most frequently adopted, whereas plyometric exercises were performed by only one-third of respondents (33.8%) (Figure 2). Balance training and advanced neuromuscular components were rarely reported, indicating incomplete program fidelity.

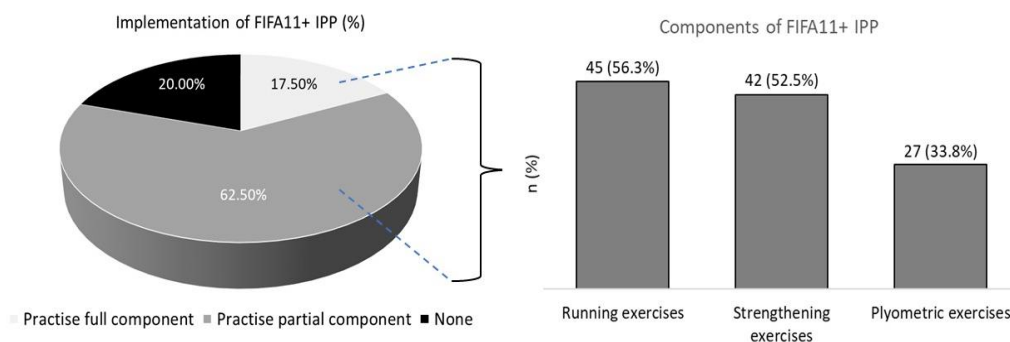


Figure 2: Implementation and component adherence of the FIFA 11+ Injury Prevention Program

Frequency of implementation also varied. Only 21.3% of respondents reported performing the program at least three times per week, while the majority practiced it once per week (43.8%) or less frequently (35.0%). Players with rare or inconsistent use of the program were significantly more likely to report multiple injuries compared to those practicing it regularly ($p = 0.004$). Furthermore, players who implemented only one or two components of the program had substantially higher odds of sustaining multiple injuries compared with those implementing all three components. These findings underscore that partial or irregular adherence compromises the preventive effectiveness of the FIFA 11+ program.

Predictors Of Multiple Football-related-injuries

Binary logistic regression analysis identified three significant predictors of multiple football-related injuries: playing position, years of experience, and adherence to the FIFA 11+ program. Specifically, occupying a midfield role, having more than 10 years of playing experience, and incomplete or inconsistent adherence to the FIFA 11+ program emerged as the strongest predictors of multiple injuries among Malaysian collegiate players.

Playing position: Midfielders demonstrated the highest injury risk, with significantly greater odds of sustaining multiple injuries compared with goalkeepers (AOR = 8.67, 95% CI: 1.59–47.15, $p = 0.012$) (Table 2). This contrasts with defenders, whose elevated risk did not reach statistical significance (AOR = 4.00, 95% CI: 0.72–22.28, $p = 0.114$).

Years of experience: Players with more than 10 years of experience had significantly higher odds of sustaining multiple injuries compared with those with less than one year of experience (AOR = 5.70, 95% CI: 1.20–27.12, $p = 0.029$; Table 2). Intermediate categories of experience (1–9 years) did not show statistically significant associations.

FIFA 11+ adherence: Players who failed to fully adhere to the FIFA 11+ program were at significantly higher risk of multiple injuries. Partial adherence was associated with increased injury risk (AOR = 0.142, 95% CI: 0.03–0.70, $p = 0.017$), while non-adherence demonstrated a similar effect (AOR = 0.130, 95% CI: 0.02–0.78, $p = 0.026$). The number of program components performed was also influential: players performing only one or two components were more likely to sustain multiple injuries compared with those performing all three components (AOR = 0.144, 95% CI: 0.03–0.77, $p = 0.023$; AOR = 0.139, 95% CI: 0.03–0.77, $p = 0.024$; Table 2). Furthermore, players who implemented the program rarely were at significantly greater risk compared to those performing it multiple times weekly (AOR = 0.087, 95% CI: 0.02–0.46, $p = 0.004$).

Table 2: Comparison of adjusted odds ratio with 95% confidence interval for multiple football injuries based on player profile characteristics and implementation of FIFA11+ injury prevention program

Variables (Reference category)	Adjusted odds ratio of multiple football injuries
	(95% confidence interval); p -value
Playing position (Goalkeeper)	
Defender	4.000 (0.72-22.28); $p = 0.114$
Midfielder	8.667 (1.59-47.15); $p = 0.012^*$

Playing experience, years (<1 year)	-
1-3 years	1.167 (0.19-7.12); $p = 0.867$
4-6 years	2.800 (0.46-16.93); $p = 0.262$
7-9 years	1.815 (0.34-9.69); $p = 0.486$
>10 years	5.704 (1.20-27.12); $p = 0.029^*$
Implementation Level of FIFA11+ IPP (Full)	-
No	0.130 (0.02-0.78); $p = 0.026^*$
Partial	0.142 (0.03-0.70); $p = 0.017^*$
Number of IPP components implemented (Three components)	-
No	0.130 (0.02-0.78); $p = 0.026^*$
One component	0.144 (0.03-0.77); $p = 0.023^*$
Two components	0.139 (0.03-0.77); $p = 0.024^*$

3.2 Discussion

This study provides new evidence on the predictors of football-related injuries and the role of the FIFA 11+ Injury Prevention Program (IPP) among Malaysian collegiate players. The results highlight three key findings: (i) the high prevalence of football-related injuries, particularly lower limb injuries; (ii) positional and experiential factors, with midfielders and players with more than 10 years of experience at greatest risk; and (iii) incomplete or inconsistent adherence to the FIFA 11+ program as a significant predictor of multiple injuries. Together, these findings underscore the cumulative burden of football injuries in collegiate populations and emphasize the importance of structured, context-specific prevention strategies.

The overall prevalence of football-related injuries in this study was 82.5%, with lower limb injuries comprising 96.9% of all cases. This mirrors findings from national and international research, where knee, ankle, and hamstring injuries consistently dominate incidence reports due to the repetitive high-impact and multidirectional demands of football (Ahmad-Shushami & Abdul-Karim, 2020; Hamdan et al., 2022; Robles-Palazon et al., 2022). Importantly, more than 60% of injured players in this study sustained multiple injuries, suggesting that collegiate players experience a cumulative burden rather than isolated episodes. Such patterns are concerning because recurrent injuries can impair performance longevity, contribute to chronic musculoskeletal conditions, and hinder academic as well as athletic commitments (Gurau et al., 2023; Hamid et al., 2014). The finding that nearly one-third of injured players reported recurrences aligns with evidence that a previous injury remains one of the strongest predictors of future injury (Fulton, 2014). This highlights the need for robust rehabilitation pathways and structured return-to-play protocols at the collegiate level, which are often less accessible compared with professional settings.

Midfielders emerged as the most injury-prone group, showing significantly greater odds of multiple injuries than goalkeepers. This observation is consistent with evidence from both amateur and elite cohorts, where the extensive physical demands placed on midfielders, including covering the greatest distances, performing frequent sprints, and engaging in sustained contact, increase biomechanical stress and elevate injury risk (Almeida, 2013; Hwang-Bo & Joo, 2019). In contrast, goalkeepers' more static role reduces cumulative exposure, supporting positional risk stratification (Leventer et al., 2016). These findings suggest that injury prevention interventions should be tailored by playing position, with midfielders requiring intensified neuromuscular training, load monitoring, and recovery management.

Playing experience was also a significant predictor, with players exceeding 10 years of participation nearly six times more likely to sustain multiple injuries compared with novices. While prior research has suggested that experience may enhance skill, tactical awareness, and physical conditioning (Haxhiu et al., 2015), the current findings align with evidence that long-term exposure also accumulates repetitive stress, overuse syndromes, and reinjury risk (Rogalski et al., 2013). This cumulative effect appears to outweigh any protective benefits of experience in the collegiate setting. The implication is that experienced players require individualized training modifications, structured recovery, and surveillance strategies to mitigate risks associated with prolonged exposure.

Despite its established efficacy in reducing football-related injuries by up to 46% when implemented consistently (Sadigursky et al., 2017; Silvers-Granelli et al., 2015), adherence to the FIFA 11+ IPP was strikingly low. Only 17.5% of players fully implemented the program, while partial adherence (62.5%) and non-adherence (20.0%) were significantly associated with higher odds of multiple injuries. These findings reinforce the critical importance of program fidelity, as incomplete implementation diminishes effectiveness (Slauterbeck et al., 2019; Thorborg et al., 2017).

The analysis further revealed that performing only one or two components of the FIFA 11+ increased injury risk compared with full implementation, while rare program use was linked to substantially greater injury odds than regular practice. This underscores that both frequency and completeness of adherence are essential to achieving protective benefits. Similar to previous studies, barriers to adherence likely include time constraints, limited awareness, and insufficient coach education (Donaldson et al., 2019; Minnig et al., 2022; Shamlaye et al., 2020). These barriers are particularly relevant in the collegiate context, where institutional support and medical expertise may be limited compared with professional environments. Tailored education programs for coaches, integration of FIFA 11+ into routine training schedules, and institutional endorsement are needed to overcome these challenges and improve compliance.

A key strength of this study is its focus on collegiate football, a population that is often underrepresented in injury prevention research despite being at high risk due to the dual demands of academics and sport. By evaluating positional roles, playing experience, and FIFA 11+ adherence simultaneously, the study provides context-specific insights with direct implications for practice. Nonetheless, several limitations warrant consideration. First, the reliance on self-reported survey data introduces risks of recall bias and reporting inaccuracy, particularly for injury history and program adherence. Second, the cross-sectional design precludes causal inference; longitudinal or interventional designs would be necessary to establish temporal relationships. Third, the study was limited to male collegiate players, restricting generalizability to female athletes and other levels of play. Future studies should expand to larger, more diverse cohorts, incorporate objective monitoring (e.g., wearable technology,

video analysis), and explore context-specific barriers to program adherence. Intervention trials examining strategies to improve FIFA 11+ compliance and evaluating their impact on injury outcomes in collegiate populations are especially warranted.

4. CONCLUSION

This study identified three key predictors of multiple football-related injuries among Malaysian collegiate players: playing position, years of experience, and adherence to the FIFA 11+ IPP. Midfielders and players with more than 10 years of experience were particularly vulnerable, reflecting the cumulative demands of positional roles and long-term participation. Low adherence to the FIFA 11+ program, whether partial or inconsistent, was also strongly associated with higher injury risk, reinforcing that its protective benefits depend on full and regular implementation. These findings have practical implications for collegiate football in Malaysia. Targeted prevention strategies for high-risk groups, together with institutional support to ensure consistent implementation of the FIFA 11+, are critical to reducing injuries and improving player safety. Strengthening adherence to structured prevention programs may also help sustain athletic performance, extend playing careers, and support players in balancing sport and academic commitments. Future research should build on these results through longitudinal and interventional studies, with particular attention to addressing barriers to program adherence.

5. ACKNOWLEDGEMENTS

This study did not receive any external funding and was self-supported by the research team. The authors extend their sincere appreciation to all respondents for their time, cooperation, and valuable contributions to this study.

6. CONFLICT OF INTEREST STATEMENT

The authors declare that they have no conflicts of interest related to this article.

7. AUTHORS' CONTRIBUTION

Mohd Azzuan Ahmad and **Tee Yi Ki** conceptualised the study design and methodology. **Tham Sze Kei, Tee Yi Ki, Wong Wan Zhi, Mohamad Nashrullah Mohd Saleh, Muhammad Noh Zulfikri Mohd Jamali** and **Kanagarajah Rarujanai** carried out the data collection and drafted the initial manuscript. **Mohd Azzuan Ahmad** and **Nor Azura Azmi** critically reviewed, revised, and approved the final version of the manuscript.

8. DECLARATION OF GENERATIVE AI IN THE WRITING PROCESS

During the preparation and revision of this manuscript, generative artificial intelligence (AI) tools may have been used to support language refinement, grammar checking, and improvement of structural clarity.

9. REFERENCES

- Ahmad-Shushami, A. H., & Abdul-Karim, S. (2020). Incidence of Football and Futsal Injuries Among Youth in Malaysian Games 2018. *Malays Orthop J*, 14(1), 28-33.
<https://doi.org/10.5704/MOJ.2003.005>
- Almeida, P., Scotta, A., Pimentel, B., Júnior, S., & Sampaio, Y. (2013). Incidence of musculoskeletal injury in soccer players. *Revista Brasileira de Medicina do Esporte*, 19, 112-115. <https://doi.org/10.1590/S1517-86922013000200008>
- Bujang, M. A., Sa'at, N., Sidik, T., & Joo, L. C. (2018). Sample Size Guidelines for Logistic Regression from Observational Studies with Large Population: Emphasis on the Accuracy Between Statistics and Parameters Based on Real Life Clinical Data. *Malays J Med Sci*, 25(4), 122-130. <https://doi.org/10.21315/mjms2018.25.4.12>
- Donaldson, A., Callaghan, A., Bizzini, M., Jowett, A., Keyzer, P., & Nicholson, M. (2018). Awareness and use of the 11+ injury prevention program among coaches of adolescent female football teams. *International Journal of Sports Science & Coaching*, 13(6), 929-938. <https://doi.org/10.1177/1747954118787654>
- Donaldson, A., Callaghan, A., Bizzini, M., Jowett, A., Keyzer, P., & Nicholson, M. (2019). A concept mapping approach to identifying the barriers to implementing an evidence-based sports injury prevention programme. *Inj Prev*, 25(4), 244-251. <https://doi.org/10.1136/injuryprev-2017-042639>
- Fuller, C. W., Ekstrand, J., Junge, A., Andersen, T. E., Bahr, R., Dvorak, J., Hägg, M., McCrory, P., & Meeuwisse, W. H. (2006). Consensus statement on injury definitions and data collection procedures in studies of football (soccer) injuries. *Br J Sports Med*, 40(3), 193-201. <https://doi.org/10.1136/bjsm.2005.025270>
- Fulton, J., Wright, K., Kelly, M., Zebrosky, B., Zanis, M., Drvol, C., & Butler, R. (2014). Injury risk is altered by previous injury: a systematic review of the literature and presentation of causative neuromuscular factors. *Int J Sports Phys Ther*, 9(5), 583-595.
- Gurau, T. V., Gurau, G., Musat, C. L., Voinescu, D. C., Anghel, L., Onose, G., Munteanu, C., Onu, I., & Iordan, D. A. (2023). Epidemiology of Injuries in Professional and Amateur Football Men (Part II). *J Clin Med*, 12(19). <https://doi.org/10.3390/jcm12196293>
- Hamdan, M., Sharir, R., Yeo, W., Adi, S., Amran, M. A., & Raja Azidin, R. F. (2022). An audit of injuries among elite Malaysia U19 and U22 league soccer players. *Malaysian Journal of Movement, Health & Exercise*, 11(2). https://doi.org/10.4103/mohe.mohe_33_22
- Hamid, M. S., Jaafar, Z., & Mohd Ali, A. S. (2014). Incidence and characteristics of injuries during the 2010 FELDA/FAM National Futsal League in Malaysia. *PLoS One*, 9(4), e95158. <https://doi.org/10.1371/journal.pone.0095158>
- Haxhiu, B., Murtezani, A., Zahiti, B., Shalaj, I., & Sllamniku, S. (2015). Risk Factors for Injuries in Professional Football Players. *Folia Med (Plovdiv)*, 57(2), 138-143. <https://doi.org/10.1515/folmed-2015-0033>
- Herrero, H., Salinero, J. J., & Del Coso, J. (2014). Injuries among Spanish male amateur soccer players: a retrospective population study. *Am J Sports Med*, 42(1), 78-85. <https://doi.org/10.1177/0363546513507767>
- Hwang-Bo, K., & Joo, C. H. (2019). Analysis of injury incidences in the Korea national men's soccer teams. *J Exerc Rehabil*, 15(6), 861-866. <https://doi.org/10.12965/jer.1938624.312>
- Leventer, L., Eek, F., Hofstetter, S., & Lames, M. (2016). Injury Patterns among Elite Football Players: A Media-based Analysis over 6 Seasons with Emphasis on Playing Position. *Int J Sports Med*, 37(11), 898-908. <https://doi.org/10.1055/s-0042-108201>

- Minnig, M. C., Hawkinson, L., Root, H. J., Driban, J., DiStefano, L. J., Callahan, L., Ambrose, K. R., Spang, J. T., & Golightly, Y. M. (2022). Barriers and facilitators to the adoption and implementation of evidence-based injury prevention training programmes: a narrative review. *BMJ Open Sport Exerc Med*, 8(3), e001374. <https://doi.org/10.1136/bmjsem-2022-001374>
- Robles-Palazon, F. J., Lopez-Valenciano, A., De Ste Croix, M., Oliver, J. L., Garcia-Gomez, A., Sainz de Baranda, P., & Ayala, F. (2022). Epidemiology of injuries in male and female youth football players: A systematic review and meta-analysis. *J Sport Health Sci*, 11(6), 681-695. <https://doi.org/10.1016/j.jshs.2021.10.002>
- Rogalski, B., Dawson, B., Heasman, J., & Gabbett, T. J. (2013). Training and game loads and injury risk in elite Australian footballers. *J Sci Med Sport*, 16(6), 499-503. <https://doi.org/10.1016/j.jsams.2012.12.004>
- Sadigursky, D., Braid, J. A., De Lira, D. N. L., Machado, B. A. B., Carneiro, R. J. F., & Colavolpe, P. O. (2017). The FIFA 11+ injury prevention program for soccer players: a systematic review. *BMC Sports Sci Med Rehabil*, 9, 18. <https://doi.org/10.1186/s13102-017-0083-z>
- Shamlaye, J., Tomsovsky, L., & Fulcher, M. L. (2020). Attitudes, beliefs and factors influencing football coaches' adherence to the 11+ injury prevention programme. *BMJ Open Sport Exerc Med*, 6(1), e000830. <https://doi.org/10.1136/bmjsem-2020-000830>
- Silvers-Granelli, H., Mandelbaum, B., Adeniji, O., Insler, S., Bizzini, M., Pohlig, R., Junge, A., Snyder-Mackler, L., & Dvorak, J. (2015). Efficacy of the FIFA 11+ Injury Prevention Program in the Collegiate Male Soccer Player. *Am J Sports Med*, 43(11), 2628-2637. <https://doi.org/10.1177/0363546515602009>
- Slauterbeck, J. R., Choquette, R., Tourville, T. W., Krug, M., Mandelbaum, B. R., Vacek, P., & Beynnon, B. D. (2019). Implementation of the FIFA 11+ Injury Prevention Program by High School Athletic Teams Did Not Reduce Lower Extremity Injuries: A Cluster Randomized Controlled Trial. *Am J Sports Med*, 47(12), 2844-2852. <https://doi.org/10.1177/0363546519873270>
- Thorborg, K., Krommes, K. K., Esteve, E., Clausen, M. B., Bartels, E. M., & Rathleff, M. S. (2017). Effect of specific exercise-based football injury prevention programmes on the overall injury rate in football: a systematic review and meta-analysis of the FIFA 11 and 11+ programmes. *Br J Sports Med*, 51(7), 562-571. <https://doi.org/10.1136/bjsports-2016-097066>
- Wang, X., & Ji, X. (2020). Sample Size Estimation in Clinical Research: From Randomized Controlled Trials to Observational Studies. *Chest*, 158(1S), S12-S20. <https://doi.org/10.1016/j.chest.2020.03.010>



© 2026 by the authors. Submitted for possible open access publication under the terms and conditions of the Creative Commons Attribution (CC BY-NC-ND) license (<http://creativecommons.org/licenses/by/4.0/>).